Creality CR10 STANDALONE MOD

Version 0.1

Author   Tristan Cebulla
Thingiverse   https://www.thingiverse.com/thing:5224673
Github   https://github.com/d1rty-pixel/CR10-Standalone-Mod

Document History

Version	Date	Author	Remarks
0.1	2022-01-30	Tristan Cebulla	Initial version (unstable)

About this modification

This mod

- adds a Voron-styled electronics compartment underneath the printer to replace the factory control box. It will also add stability and rigidity and weight to the frame. It improves cooling and provides better maintenance access to your electronics.

- will require you to disassemble your printer, do some re-wiring and fiddle with mains power.

- is considered work-in-progress as many parts are not final and are subject to change.

Although this mod should work on any CR10, it only has been tested on the CR10 V2. Please check dimensions and for colliding parts.

A word of caution

You are about to disassemble your printer. Do not continue unless you know what you are doing. These instructions do not replace fundamental knowledge of how a 3D printer works.

You will need to rewire the electronics of your printer. Your printer runs on 110/220 Volts. It is important to understand what you are doing to avoid injury and death. Mains power can kill, and it will hurt the entire time you're dying from it. This is not something you want to guess your way through.

Disclaimer

This document represents my personal journey while creating the standalone modification on my Creality CR10 V2 3D printer.

You may destroy your printer.

You may get hurt, injured or even die.

I am not responsible for anything you do.

Do not ask me for help.

Table of contents

Bill of Material (BOM)

Frame

The CR10 3D printer is assembled of aluminum extrusion profiles that come pre-drilled for easy and convenient assembly. Since this requires precise drilling, this mod uses slot 6 L shape inner connectors to connect the extrusion profiles to each other.

Component	Standard	Qty	Dimensions / Length
Aluminum Extrusion 2020	Type B Slot 6	3	400 mm
Aluminum Extrusion 2020	Type B Slot 6	2	380 mm
Aluminum Extrusion 2020	Type B Slot 6	1	360 mm
Aluminum Extrusion 2020	Type B Slot 6	1	320 mm
Aluminum Extrusion 2020	Type B Slot 6	1	100 mm
Aluminum Extrusion 2020	Type B Slot 6	4	60 mm
Aluminum Extrusion 2020	Type B Slot 6	2	40 mm
Aluminum Extrusion 2040	Type B Slot 6	4	60 mm
L Shape Inner Connectors with screws	Slot 6	40	
Hammer nut	Slot 6	32	M3
Acrylic plate	Temperature resistance 70° C	1	390 mm x 320 mm

Electronic Parts

The electronics compartment will (at least) contain your mainboard and a power supply unit (PSU). In addition, you are also able to fit in a secondary PSU, a Raspberry PI, a Solid State Relay and other parts you may need or want to equip your printer with.

> ⚠️ The DIN rails will be mounted horizontally and pointing down, which is non-standard usage. According to safety standards (VDE, NEC, etc) you are not allowed to mount DIN rail hardware onto a DIN rail when used in this orientation. Use clips and brackets provided by the Voron team to mount hardware onto a DIN rail.

Component	Standard	Qty	Dimensions / Length
DIN rail	EN 50022	2	300 mm - 350 mm
Sunon MF60252VX-1 fan	60 mm x 60 mm, 24 Volts	2	max. thickness 30 mm
IEC-GS-1-100 mains connector / switch		1	
USB 2.0 / 3.0 keystone module		1	
RJ45 ethernet keystone module		1	

Sourcing Guide

Mains power connector

The mains power connector plate is especially designed for the IEC-GS-1-100 connector. You can use another connector, but you will need to modify the plate.

https://www.digikey.de/en/products/detail/adam-tech/IEC-GS-1-100/9831135

RJ-45 network connector

Use a RJ-45 keystone jack. Any module that fits your hardware requirements will work. Passthrough modules are recommended for easy installation.

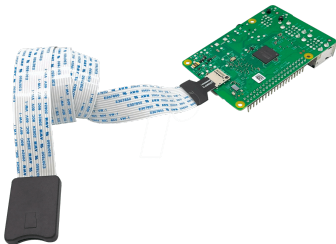You will find dozens of suppliers and variants.

USB connector

Use a USB 2/3 or mini/micro USB keystone jack. They are available as passthrough modules or with an USB cable.

You will find dozens of suppliers and variants.

SD Cable Extension

Use a Raspberry RPI MSD FL50 extension cable (50cm length) or similar product. You can mount it everywhere with double sided tape, or integrate it into your LCD / display case.

Cooling fans

Use premium quality low-noise high-airflow fans that run on 24 Volts. The fans can be connected to your PSU directly or to the mainboard, if it provides two 2-pin 24 Volt headers.

A Sunon MF60252VX-1 fan (60 mm x 60 mm x 25 mm, 24 Volts, 45,8 m³/h, 31,2 dBA) might be a good start.

Of course you also can use 12 Volt fans, but you would need a voltage converter module that requires additional space, mounting and wiring.

A fan can not be thicker than 30 mm due to space limitations.

Additional, alternate and upgraded quality parts

It is always a good idea to invest in quality parts. Since you're in the middle of a fundamental upgrade, I want to say it with the words of Moloko: "The time is now".

Mean Well PSU

A better quality power supply unit can improve power consumption and overall stability. It has to be chosen according to electrical needs. A good start would be Mean Wells LRS product line, e.g. a LRS-350-24 or LRS-250-24.

Raspberry Pi / 15 Watt PSU

There are several reasons to use a Raspberry Pi in your printer setup. It is recommended to use a separate power supply unit for the Raspberry Pi instead of powering the Pi through USB.

A Mean Well RS-15-5 is a good and reliable power supply unit, whose output voltage can be adjusted to 5.1 Volts for the Raspberry Pi to operate properly.

220 Volt Heatbed with SSR

In order to improve bed heating time you can switch to a 220 Volt heated bed. This has to be connected to mains power directly and must be controlled via the mainboard. For this modification you will need a Solid State Relay.

Please choose it according to your heat bed configuration.

Print parts

All parts can be printed from PLA, however ABS is recommended.
To match the theme of this mod you are encouraged to use a filament color similar to the "Creality blue". A suitable HEX color code might be #18ADE8.

Print settings:
- 5 wall lines
- 4 (or more) bottom/top layers
- 30% infill
- No support needed

STL files overview

A STL file may contain suffixes like _x[number]. They indicate to print this part times the number behind the x.

plate_normal_x4.stl	Cover plate (4x)
plate_fan_x2.stl	Cover plate with fan mount (2x)
plate_mains_connector.stl	Cover plate to mount all connectors on
plate_passthrough.stl	Passthrough hole for all cables if you do not want to add separate connectors
plate_keystone_passthrough.stl	Plate for 3 keystone modules and a passthrough hole

Vendor print parts

DIN rail clips and part brackets from the Voron team can be found here:
https://github.com/VoronDesign/Voron-2/tree/Voron2.4/STLs/VORON2.4/Electronics_Compartment/DIN_Brackets

Please check the Voron documentation for print settings on their parts. Normally they recommend to print in ABS.

LCD / Display Panel

Please find an appropriate model for your display type. It can be mounted onto the frame in any location. Please check cable lengths for the display connector. Depending on the mount location of your LCD display, you probably do not need the associated extrusion profiles (2x 40 mm, 1x 100 mm).

Assembly instructions

You are about to disassemble your printer.
Make sure you do not need to print parts anymore.

Keep your stuff organized.
Make photos and label wires.
Do anything that can help you make reassembling easier for you.

Disassemble your printer

- Disconnect mains power.

- Disassemble your printer except for the bed and its moving apparatus, and everything related to the X axis gantry.

- Remove all electrical connections, like from the stepper motors, the hot end, thermistors, the bed etc.

- Unscrew the module from beneath the original frame that connects to your X axis gantry, and remove it.

- Remove the shock absorbers from underneath the original frame.

- Open the control box and disassemble it completely.

Assemble the frame

Assemble the connector plates

Equip the connector plate with keystone modules according to your hardware specifications. The original CR10 V2 uses USB 2.0 for communicating with a desktop computer, laptop or Raspberry Pi.

If you use a Raspberry Pi you also want to equip an ethernet RJ-45 keystone module, and maybe an additional USB module.

Also install the IEC mains power connector to the power connector plate and wire it up.

Make electrical connections as per your hardware requirements

Connect bed, hotend and other components to the connector plate